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IN THE CLAIMS

Please amend claims 13 and 14 as follows below.

The following is a complete listing of claims 1-60 marked up as amended by this Response.

1 1. (Original) A connection protection mechanism for an
2 optical cross-connect switch, the connection protection
3 mechanism comprising:

4 the optical cross-connect switch to couple to client
5 equipment, the optical cross-connect switch to bi-
6 directionally transport optical signals with the client
7 equipment, the optical cross-connect switch including
8 one or more working ports to couple to the client
9 equipment, each of the one or more working ports to
10 couple to the client equipment using a pair of working
11 links, and

12 a protection port to couple to the client
13 equipment using a pair of protection links;
14 and

15 a signaling channel to transport a connection failure
16 signal indicating if one working port of the one or more
17 working ports has a connection failure in its working link
18 or the one working port coupling to the client equipment.

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- 1 2. (Original) The connection protection mechanism of
- 2 claim 1 wherein,
 - 3 if the one working port of the one or more working
 - 4 ports has the connection failure, the optical cross-connect
 - 5 switch to switch the coupling to the client equipment from
 - 6 the one working port to the protection port.
- 1 3. (Original) The connection protection mechanism of
- 2 claim 1 wherein,
 - 3 the optical cross-connect switch is without an
 - 4 optical-electrical-optical converter (O/E/O) but has a
 - 5 sensor to detect the connection failure.
- 1 4. (Original) The connection protection mechanism of
- 2 claim 1 wherein,
 - 3 the client equipment includes one or more of the set
 - 4 of wavelength division multiplexed (WDM) line terminals,
 - 5 SONET add/drop multiplexers, internet protocol (IP)
 - 6 routers, additional optical cross-connect switches and
 - 7 Asynchronous Transfer Mode (ATM) switches.
- 1 5. (Original) The connection protection mechanism of
- 2 claim 1 wherein,
 - 3 the optical cross-connect switch further includes

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4 at least one network port to couple to a network
5 to bi-directionally transport optical signals with the
6 network.

1 6. (Original) The connection protection mechanism of
2 claim 5 wherein,

3 the optical cross-connect switch further includes
4 a first optical switch fabric of optical
5 switches to connect at least one pair of optical
6 signals between the network equipment and the client
7 equipment.

1 7. (Original) The connection protection mechanism of
2 claim 1 wherein,

3 the optical cross-connect switch further includes a
4 first optical switch fabric, and
5 if the one working port of the one or more working
6 ports has the connection failure, the first optical switch
7 fabric to switch the coupling to the client equipment
8 through the one working port to the protection port.

1 8. (Original) The connection protection mechanism of
2 claim 1 wherein,

3 the signaling channel is an out-of-band signaling
4 channel.

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1 9. (Original) The connection protection mechanism of
2 claim 8 wherein,
3 the out-of-band signaling channel is a communication
4 channel over a network.

1 10. (Original) The connection protection mechanism of
2 claim 9 wherein,
3 the optical cross-connect switch further includes
4 a network management controller to couple to a
5 network and the one or more working ports and the
6 protection port, the network management controller to
7 transmit and to receive connection failure signals
8 over the signaling channel regarding the working links
9 between the optical cross-connect switch and the
10 client equipment.

1 11. (Original) The connection protection mechanism of
2 claim 9 wherein,
3 the network is a local area network, a metropolitan
4 network, a wide area network, an internet, or an intranet.

1 12. (Original) The connection protection mechanism of
2 claim 1 wherein,
3 the signaling channel is an in-band signaling channel.

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1 13. (Currently Amended) The connection protection
2 mechanism of claim 12 [[8]] wherein,
3 the in-band signaling channel is the working link
4 without the connection failure of the pair of working links
5 having the connection failure.

1 14. (Currently Amended) The connection protection
2 mechanism of claim 12 [[8]] wherein,
3 the in-band signaling channel is a dedicated signaling
4 link in parallel with each of the pair of working links.

1 15. (Original) The connection protection mechanism of
2 claim 6 wherein,
3 the optical cross-connect switch further includes
4 a second optical switch fabric of optical
5 switches to provide a redundant optical switch fabric
6 in case of a failure in the first optical switch
7 fabric,
8 and
9 wherein if the one working port of the one or more
10 working ports has the connection failure, the second
11 optical switch fabric to switch the coupling to the client
12 equipment through the one working port to the protection
13 port.

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1 16. (Original) The connection protection mechanism of
2 claim 1 wherein,
3 the optical cross-connect switch further includes
4 a second protection port to couple to the client
5 equipment using a second pair of protection links
6 and,
7 wherein if the one working port of the one or more
8 working ports has the connection failure, the optical
9 cross-connect switch to switch the coupling to the client
10 equipment from the one working port to the second
11 protection port.

1 17. (Original) The connection protection mechanism of
2 claim 6 wherein,
3 the optical switches of the optical switch fabric are
4 micro-machined mirrors to direct optical signals between
5 the client and the network.

1 18. (Original) A method for protecting connections
2 between an optical cross-connect switch and a client, the method
3 comprising:
4 detecting a connection failure on a working link of a
5 pair of working links between the optical cross-connect
6 switch and the client;

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7 signaling the optical cross-connect switch or the
8 client of the connection failure in response to detecting
9 the connection failure; and
10 switching to a pair of protection links between the
11 optical cross-connect switch and the client from the pair
12 of working links having the connection failure.

1 19. (Original) The method of claim 18 wherein,
2 the optical cross-connect switch is without an
3 optical-electrical-optical converter (O/E/O) but has a
4 sensor to detect the connection failure.

1 20. (Original) The method of claim 18 wherein,
2 the client includes one or more of the set of
3 wavelength division multiplexed (WDM) line terminals, SONET
4 add/drop multiplexers, internet protocol (IP) routers,
5 additional optical cross-connect switches and Asynchronous
6 Transfer Mode (ATM) switches.

1 21. (Original) The method of claim 18 further comprising:
2 providing a signaling channel between the optical
3 cross-connect switch and the client; and
4 wherein the signaling includes

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5 transmitting a connection failure signal over the
6 signaling channel to the optical cross-connect switch or
7 the client in response to detecting the connection failure.

1 22. (Original) The method of claim 21 wherein,
2 the signaling channel is an out-of-band signaling
3 channel.

1 23. (Original) The method of claim 18 further comprising:
2 cross-connecting optical signals between the client
3 and a communication network using micro-machined mirrors.

1 24. (Original) The method of claim 18 wherein,
2 the connection failure is detected by the optical
3 cross-connect switch in the working link from the client to
4 the optical cross-connect switch, and the optical cross-
5 connect switch signals the connection failure to the client
6 by

7 disabling optical signal propagation from the optical
8 cross-connect switch to the client over the working link
9 without the connection failure of the pair of working links
10 with the connection failure.

1 25. (Original) The method of claim 18 wherein,

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1 28. (Original) The method of claim 18 wherein,
2 the connection failure is detected by the client in
3 the working link from the optical cross-connect switch to
4 the client, and the client signals the connection failure
5 to the optical cross-connect switch by
6 transmitting an optical signal having a pattern over
7 the working link from the client to the optical cross-
8 connect switch without the connection failure, the pattern
9 indicating the connection failure in the working link from
10 the optical cross-connect switch to the client.

1 29. (Original) A connection protection interface for an
2 optical cross-connect switch, the connection protection
3 interface comprising:
4 one or more I/O port cards in the optical cross-
5 connect switch, each of the one or more I/O port cards to
6 couple to a client equipment using working optical links;
7 and
8 M protection port cards for every N I/O port cards of
9 the one or more I/O port cards, the M protection port cards
10 to couple to the client equipment using protection optical
11 links.

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1 30. (Original) The connection protection interface of
2 claim 29 wherein,
3 the protection port cards to bi-directionally
4 transport optical signals with the client equipment over
5 the protection optical links in the event of a connection
6 failure in a working link in one of the one or more I/O
7 port cards.

1 31. (Original) The connection protection interface of
2 claim 29 wherein,
3 each of the working optical links is a pair of optical
4 fiber and each of the protection optical links is a pair of
5 optical fibers.

1 32. (Original) The connection protection interface of
2 claim 29 wherein,
3 each of the working optical links is a single optical
4 fiber and each of the protection optical links is a single
5 optical fiber.

1 33. (Original) The connection protection interface of
2 claim 29 wherein,
3 M is greater than or equal to one and N is greater
4 than or equal to one.

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1 34. (Original) The connection protection interface of
2 claim 29 wherein,
3 each of the one or more I/O port cards of the optical
4 cross-connect switch is without an optical-electrical
5 optical converter (O/E/O) but each has a sensor to detect
6 the connection failure between the client equipment and the
7 optical cross-connect switch.

1 35. (Original) The connection protection interface of
2 claim 29 wherein,
3 the client equipment includes one or more of the set
4 of wavelength division multiplexed (WDM) line terminals,
5 SONET add/drop multiplexers, internet protocol (IP)
6 routers, additional optical cross-connect switches and
7 Asynchronous Transfer Mode (ATM) switches.

1 36. (Original) The connection protection interface of
2 claim 29 wherein,
3 the one or more I/O port cards to communicate with the
4 client equipment are client port cards.

1 37. (Original) The connection protection interface of
2 claim 29 wherein,

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3 at least one I/O port card to communicate with a
4 network and is a network port card.

1 38. (Original) The connection protection interface of
2 claim 29 wherein,

3 each of the one or more I/O port cards further has a
4 dedicated signal line to couple to a respective I/O port
5 card of the client equipment, the dedicated signal line to
6 transmit and receive connection failure signals regarding
7 the connection between the optical cross-connect switch and
8 the client equipment.

1 39. (Original) The connection protection interface of
2 claim 29 further comprising:

3 an out of band signaling channel to transmit a
4 connection failure signal in response to the sensor
5 detecting a connection failure in a working link from the
6 client equipment to the optical cross-connect switch.

1 40. (Original) The connection protection interface of
2 claim 39 wherein,

3 the connection failure signal indicates the
4 connection failure and which of the one or more I/O
5 port cards has the connection failure.

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1 41. (Original) The connection protection interface of
2 claim 29 wherein,

3 the connection failure is detected by the optical
4 cross-connect switch in a working link from the client
5 equipment to the optical cross-connect switch, and the
6 optical cross-connect switch signals the connection failure
7 to the client equipment by

8 disabling optical signal propagation from the optical
9 cross-connect switch to the client equipment over the
10 working link without the connection failure of the one I/O
11 port card of the one or more I/O port cards with the
12 connection failure.

1 42. (Original) The connection protection interface of
2 claim 29 wherein,

3 the connection failure is detected by the optical
4 cross-connect switch in a working link from the client
5 equipment to the optical cross-connect switch, and the
6 optical cross-connect switch signals the connection failure
7 to the client equipment by

8 transmitting an optical signal having a pattern over
9 the working link without the connection failure of the one
10 I/O port card of the one or more I/O port cards with the
11 connection failure, the optical signal having the pattern

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12 indicating the connection failure in the working link from
13 the client to the optical cross-connect switch.

1 43. (Original) The connection protection interface of
2 claim 42 wherein,

3 the pattern of the optical signal indicates the
4 connection failure and which of the one or more I/O port
5 cards has the connection failure.

1 44. (Original) A protected connection between an optical
2 cross-connect switch and a client equipment in a communication
3 network system, the protected connection comprising:

4 one or more pairs of optical links coupled between the
5 optical cross-connect switch and the client equipment as
6 working links over which optical signals ordinarily
7 propagate without a connection failure; and

8 at least one pair of optical links coupled between the
9 optical cross-connect switch and the client equipment as
10 protection links over which optical signals can atypically
11 propagate in the event of a connection failure.

1 45. (Original) The protected connection of claim 44
2 wherein,

3 the optical cross-connect switch includes,

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4 one or more input/output (I/O) ports coupled to
5 the one or more pairs of optical links as the working
6 links to connect and bi-directionally transport
7 optical signals with the client equipment, and
8 at least one protection port to couple to the at
9 least one pair of optical links as the protection
10 links to connect with the client equipment and
11 atypically bi-directionally transport optical signals
12 with the client equipment in the event of a connection
13 failure in the working links of the one or more pairs
14 of optical links;
15 and
16 the client equipment includes,
17 one or more I/O ports coupled to the one or more
18 pairs of optical links as the working links to connect
19 and bi-directionally transport optical signals with
20 the optical cross-connect switch, each of the one or
21 more I/O ports having a sensor to detect a connection
22 failure between the client equipment and the optical
23 cross-connect switch, and
24 at least one protection port to couple to the at
25 least one pair of optical links as the protection
26 links to connect with the optical cross-connect switch
27 and atypically bi-directionally transport optical
28 signals with the optical cross-connect switch in the

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29 event of a connection failure in the working links of
30 the one or more pairs of optical links.

1 46. (Original) The protected connection of claim 45
2 wherein,

3 the one or more I/O ports of the optical cross-connect
4 switch are without an optical-electrical-optical converter
5 (O/E/O) but each has a sensor to detect a connection
6 failure between the client equipment and the optical cross-
7 connect switch.

1 47. (Original) The protected connection of claim 44
2 wherein,

3 the client equipment includes one or more of the set
4 of wavelength division multiplexed (WDM) line terminals,
5 SONET add/drop multiplexers, internet protocol (IP)
6 routers, additional optical cross-connect switches and
7 Asynchronous Transfer Mode (ATM) switches.

1 48. (Original) The protected connection of claim 44
2 further comprising:

3 an out-of-band signaling channel between the client
4 equipment and the optical cross-connect switch, the out-of-
5 band signaling channel to transmit a connection failure
6 signal in response to detection of a connection failure in

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7 the working links between the client equipment and the
8 optical cross-connect switch.

1 49. (Original) The protected connection of claim 48
2 wherein,

3 the out-of-band signaling channel is a
4 communication channel of a network.

1 50. (Original) The protected connection of claim 48
2 wherein,

3 the connection failure signal indicates the
4 connection failure and which of the one or more I/O
5 ports of the client equipment and the optical cross-
6 connect switch has the connection failure.

1 51. (Original) The protected connection of claim 44
2 further comprising:

3 one or more in-band signaling channels between the
4 client equipment and the optical cross-connect switch, the
5 one or more in-band signaling channels to transmit a
6 connection failure signal in response to detection of a
7 connection failure in the working links between the client
8 equipment and the optical cross-connect switch.

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1 52. (Original) The protected connection of claim 51
2 wherein,

3 the connection failure signal indicates the
4 connection failure and which of the one or more I/O
5 ports of the client equipment and the optical cross-
6 connect switch has the connection failure.

1 53. (Original) The protected connection of claim 51
2 wherein,

3 the one or more in-band signaling channels between the
4 client equipment and the optical cross-connect switch are
5 one or more dedicated signal lines coupled between the
6 respective one or more I/O ports of the client equipment
7 and the optical cross-connect switch, the one or more
8 dedicated signal lines to transmit and receive connection
9 failure signals regarding the connection between the
10 optical cross-connect switch and the client equipment.

1 54. (Original) The protected connection of claim 51
2 wherein,

3 the one or more in-band signaling channels between the
4 client equipment and the optical cross-connect switch are
5 the optical links without the connection failure of
6 the one or more pairs of optical links of the working links

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7 having the connection failure, the optical links without
8 the connection failure to propagate connection failure
9 signals regarding the connection between the optical cross-
10 connect switch and the client equipment.

1 55. (Original) The protected connection of claim 51
2 wherein,

3 the connection failure is detected by an I/O port of
4 the optical cross-connect switch in an optical link of a
5 pair of optical links and the optical cross-connect switch
6 signals the connection failure to the client equipment by
7 disabling optical signal transport from the optical
8 cross-connect switch to the client equipment over another
9 optical link without the connection failure of the pair of
10 optical links.

1 56. (Original) The protected connection of claim 51
2 wherein,

3 the connection failure is detected by an I/O port of
4 the optical cross-connect switch in an optical link of a
5 pair of optical links and the optical cross-connect switch
6 signals the connection failure to the client equipment by
7 transmitting an optical signal having a pattern over
8 another optical link without the connection failure of the
9 pair of optical links, the optical signal having the

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10 pattern indicating the connection failure in the optical
11 link.

1 57. (Original) The protected connection of claim 51
2 wherein,

3 the connection failure is detected by an I/O port of
4 the client equipment in an optical link of a pair of
5 optical links and the client equipment signals the
6 connection failure to the optical cross-connect switch by
7 disabling optical signal transport from the client
8 equipment to the optical cross-connect switch over another
9 optical link without the connection failure of the pair of
10 optical links.

1 58. (Original) The protected connection of claim 51
2 wherein,

3 the connection failure is detected by an I/O port of
4 the client equipment in an optical link of a pair of
5 optical links and the client equipment signals the
6 connection failure to the optical cross-connect switch by
7 transmitting an optical signal having a pattern over
8 another optical link without the connection failure of the
9 pair of optical links, the optical signal having the
10 pattern indicating the connection failure in the optical
11 link.

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1 59. (Original) A connection protection mechanism for
2 optical network equipment, the connection protection mechanism
3 comprising:

4 the optical network equipment to couple to client
5 equipment, the optical network equipment to bi-
6 directionally transport optical signals with the client
7 equipment, the optical network equipment including
8 one or more working ports to couple to the client
9 equipment, each of the one or more working ports to
10 couple to the client equipment using a pair of working
11 links, and
12 a protection port to couple to the client
13 equipment using a pair of protection links;
14 and
15 a signaling channel to transmit and receive a
16 connection failure signal indicating if one working port of
17 the one or more working ports has a connection failure in a
18 working link or a working port coupling to the client
19 equipment.

1 60. (Original) The connection protection mechanism of
2 claim 59 wherein,

3 if the one working port of the one or more working
4 ports has the connection failure, the optical network

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- 5 equipment to switch the coupling to the client equipment
- 6 from the one working port to the protection port.